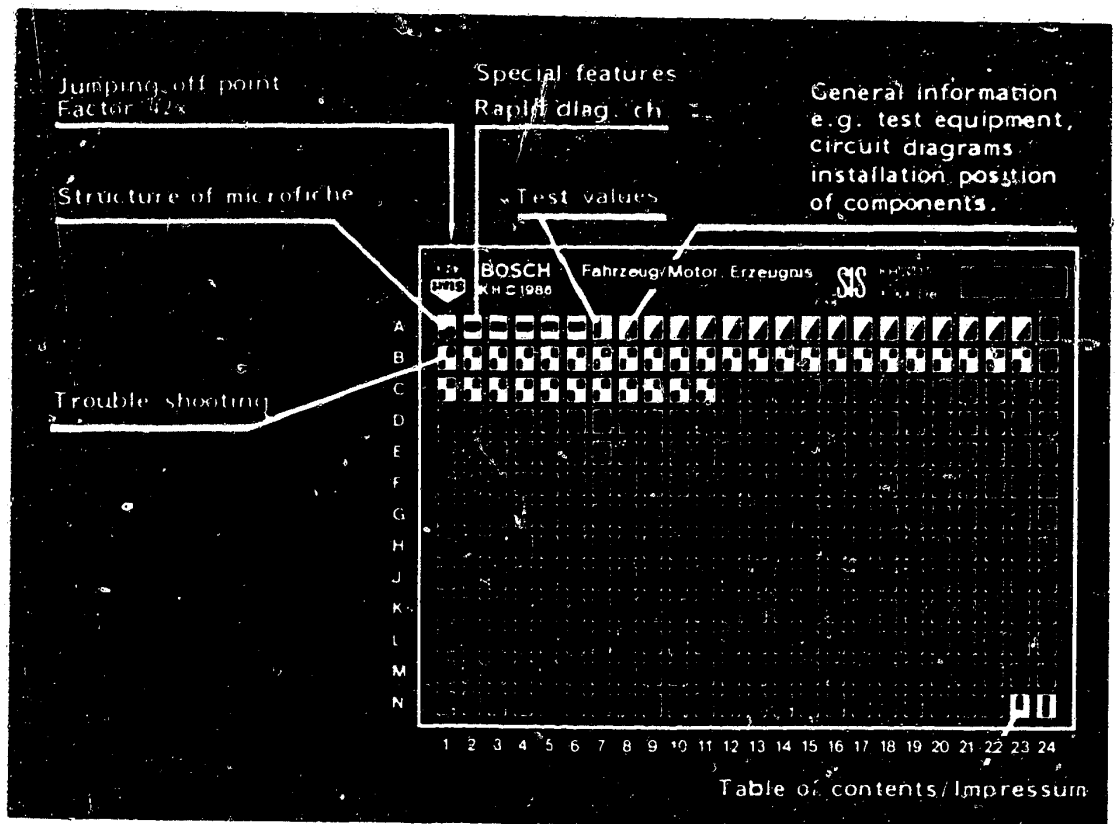


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate).

E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section

Beginning	Mid-section	End	One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

A1	Trouble-shooting program	
-----------	--------------------------	--

1. Special features

The electronic climate control has been installed in the Ferrari Mondial Type 108 since the beginning of 1986.

2. Rapid diagnosis chart

The following rapid diagnosis chart makes it possible for the experienced expert to quickly check the systems with heating and air-conditioning test adapter KDHK 0001 and adapter lead KDHK 0011.

The contents of this chart are limited to the following:

- Sequence of test steps
- Switch position on adapter
- Test instructions and test specifications (readings on adapter)
- References to coordinates of the respective detailed testing and trouble-shooting program.

If detailed information and instructions are required, always proceed in accordance with the trouble-shooting program starting on Coordinate B1.

Test conditions

- Check the customer complaint
(Check operation of air-conditioner in accordance with vehicle owner manual).
- Electrical system (fuses, battery voltage) O.K.
- Refrigerant level O.K.
- Coolant level O.K.
- Engine running at operating temperature
- Blower-speed selector in middle position
- Temperature sensor approximately in middle position (approx. +24°C)
- A/C switch disengaged
- Side and middle nozzles open

The ignition must be switched off before disconnecting plug connections.



Rapid diagnosis chart for electronic air-conditioning control
Test adapter KDHK 0001 with adapter lead KDHK 0011

Test step	Rotary-switch position	Test of	Test instructions	Reading/ test specification	Coordinates
1	1	Supply voltage, electronic control unit	Engine running and at normal operating temperature	10 ... 13	B 4
2	3	Temperature selector	Slide temperature selector from cold to warm. Reading must change between Min. and Max.	0 ... 13	B 6
3	3	Magnetic clutch, refrigerator compressor	Actuate push-button (T) on test adapter, magnetic clutch must click audibly. Keep push-button (T) held. Air flow must become cooler, check by feeling.	0 ... 3	B 8
4	5	Evaporator-temperature sensor	Release push-button (T) (wait until air flow reassumes ambient temperature).	9 ... 11	B 10
4.1			Press push-button (T)	Value falls	B 12
5	7	Heating-water valve	Switch on auxiliary switch (S) on test adapter. <u>No heating effect</u> - check by feeling.	0 ... 3	B 14
5.1			Switch off auxiliary switch (S) on test adapter. <u>Heating effect</u> - check by feeling.	9 14	B 16
6	8	Discharge-temperature sensor	Test step to come directly after 5.1 (water in heat exchanger must be hot at start of test).	7 ... 12 slowly falling	B 18

A3

Rapid diagnosis chart
Ferrari Mondial



A4

Rapid diagnosis chart
Ferrari Mondial



Rapid diagnosis chart for electronic climate control (continued)

Test adapter KDHK 0001 with adapter cable KDHK 0011

Test step	Rotary-switch position	Test of:	Test instructions	Reading/ test specifications	Coordinates
7	10	Interior temperature sensor		7 ... 11	B 20
7.1			Spray with refrigerant spray	Value decreases	B 21
7.2			Check ventilation of interior temperature sensor (with paper strip)	-	C 1
8	11	Hot-water pump	Switch on auxiliary switch (S) on test adapter. <u>Hot-water pump runs</u> - ascertain by feel/hearing	0 ... 3	C 3
8.1			Switch off auxiliary switch (S) on test adapter. <u>Hot-water pump not running</u> - ascertain by feel/hearing	9 ... 14	C 5
9	13	Outside temperature sensor		6 ... 10	C 7
10	14	DEF switch	Press DEF switch	11 ... 13	C 9

A5

Rapid diagnosis chart
Ferrari Mondial



A6

Rapid diagnosis chart
Ferrari Mondial



3. Test specifications, NTC sensor

Evaporator temperature sensor $R_{25^{\circ}\text{C}}^* = 9.0 \pm 0.3 \text{ k}\Omega$

Blow-in temperature sensor $R_{25^{\circ}\text{C}}^* = 10.0 \pm 0.8 \text{ k}\Omega$

Interior temperature sensor $R_{25^{\circ}\text{C}}^* = 10.0 \pm 0.8 \text{ k}\Omega$
or at 15 ... 30°C
16 ... 8 kΩ

Outside temperature sensor $R_{25^{\circ}\text{C}}^* = 1.0 \pm 0.1 \text{ k}\Omega$
or at 15 ... 30°C
922 ... 1000 Ω

* $R_{25^{\circ}\text{C}}$ = Resistance of the NTC at 25°C ambient temperature.



4. General introduction

Electronically-controlled air-conditioning system FERRARI M O N D I A L

The control of the interior temperature is carried out by the electronic control unit.

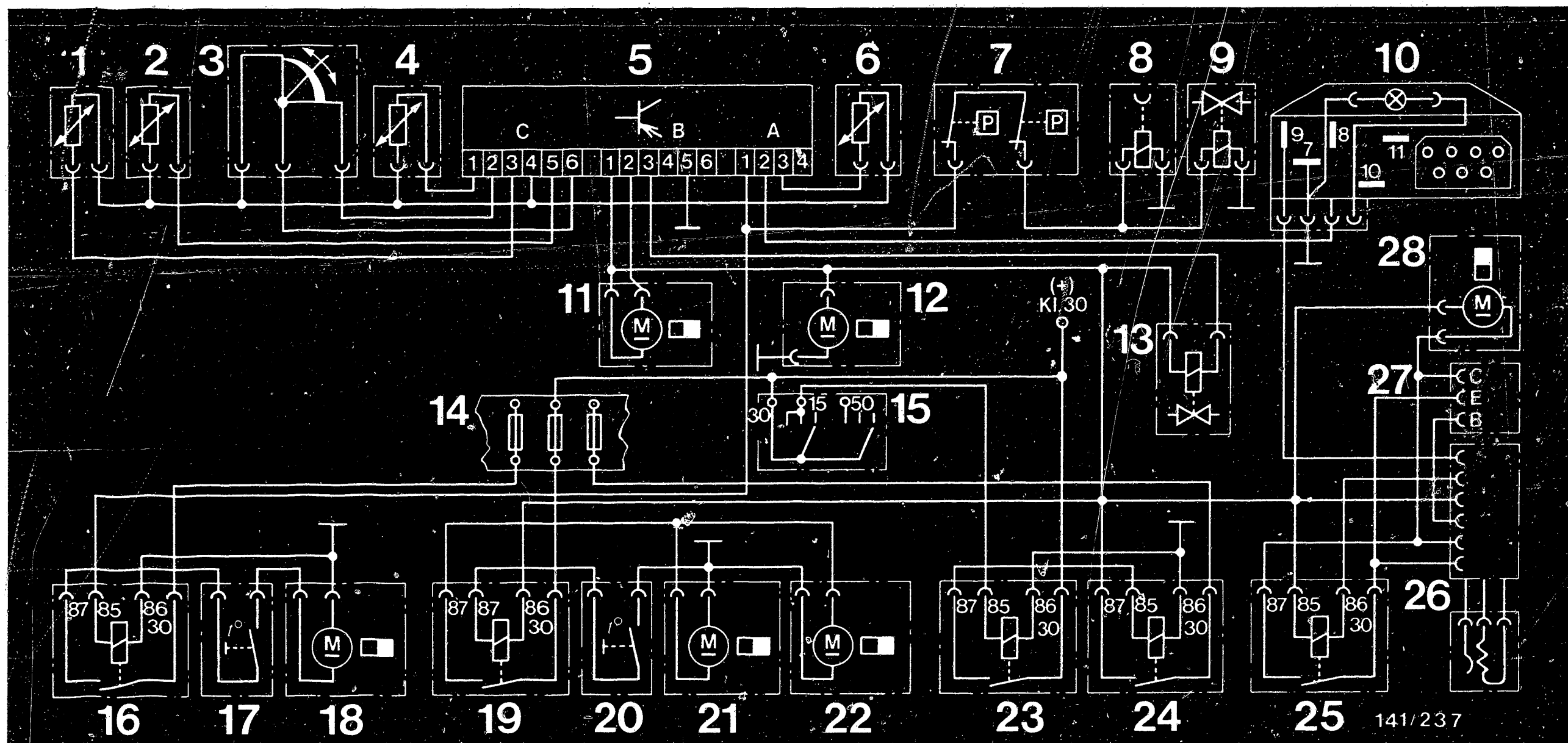
With the infinitely-variable temperature sensor, the desired interior temperature can be pre-selected at the operating section (center console).

In the control unit, the pre-selected temperature (set value) is compared with the temperature measured by the interior sensor (actual value), and the deviation from the set value is eliminated depending on the blow-in temperature and the outside temperature. In doing this, the control alters the on-off ratio of the mono heating-water valve. The control works on the hot-water side. If a cooler interior temperature is desired, the actuation time of the heating-water valve is extended. If this is inadequate to reduce the temperature, the refrigeration compressor is switched on. Here as well there are no fixed switching values, since the switching point is in relation to the 4 temperature sensors. Operation on both sides with heater and refrigeration compressor is also possible for dehumidifying the air.

In order to ensure that sufficient hot water flows through the heat exchanger even at low engine speeds, a hot-water pump was installed which guarantees adequate circulation.

Air is distributed in accordance with the switch for air-conditioning operation located on the center tunnel. Individual adjustment of the air flaps is not provided.





- | | | |
|-----------------------------------|--|--------------------------|
| 1 = Interior temperature sensor | 8 = Compressor solenoid coupling | 13 = Heating-water valve |
| 2 = Outside temperature sensor | 9 = Bypass valve for engine-speed increase | 14 = Fuse strip |
| 3 = Temperature selector | 10 = Pushbuttons on center console | 15 = Ignition lock |
| 4 = Blow-in temperature sensor | 11 = Ventilation motor for interior temperature sensor | |
| 5 = Electronic control unit | 12 = Hot-water pump | |
| 6 = Evaporator temperature sensor | | |
| 7 = High-/low-pressure switch | | |

5. Schematic circuit diagram of electronic climate control

A9

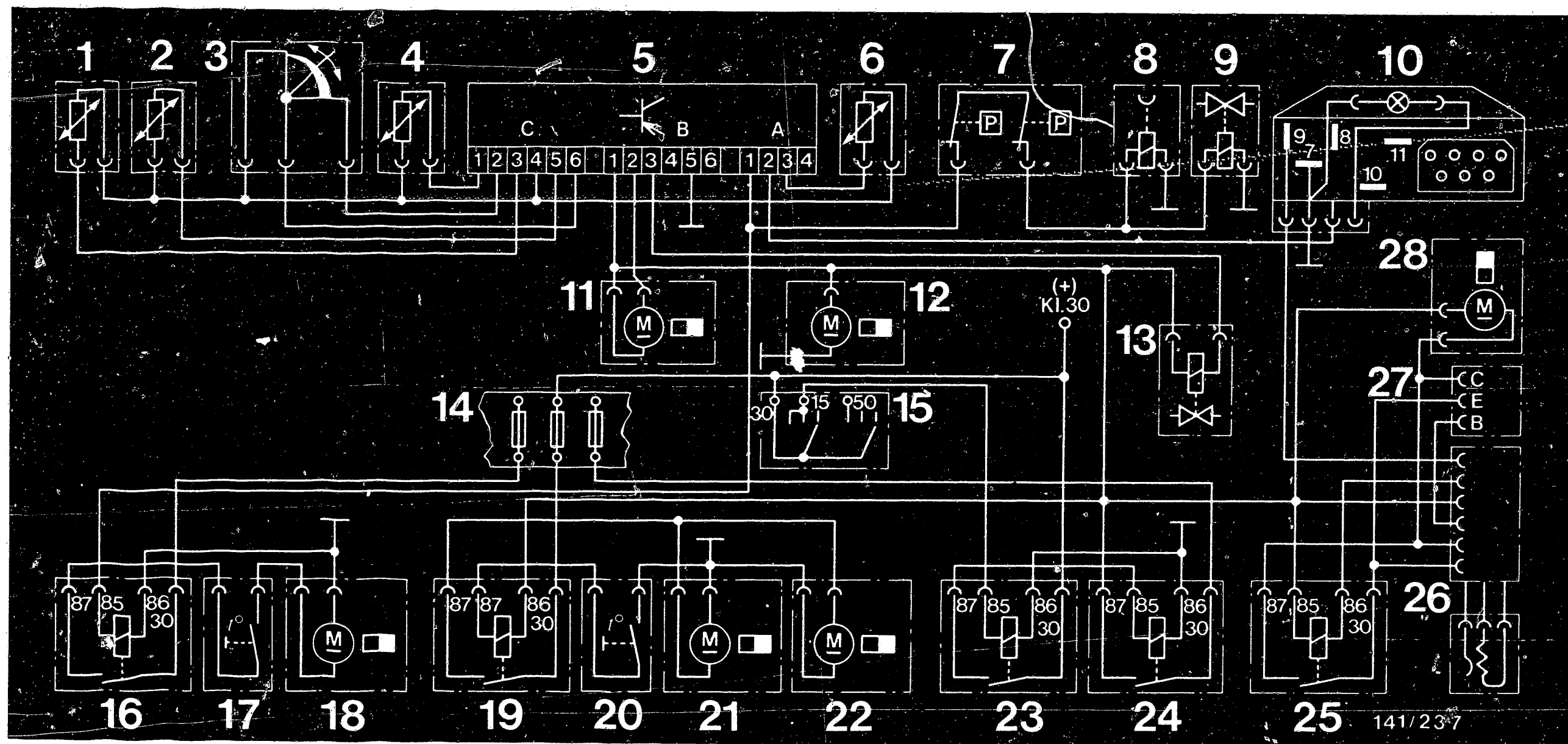
Circuit diagram
Ferrari Mondial



A10

Circuit diagram
Ferrari Mondial





- 16 = Condensor-fan relay
 17 = Temperature switch
 for condensor fan
 18 = Condensor fan
 19 = Relay for blowers I + II
 20 = Temperature switch for cold-water
 blowers

- 21 = Cold-water fan II
 22 = Cold-water fan I
 23 = Main relay
 24 = Relay terminal 15
 25 = Relay for blower power output stage
 26 = Speed selector for blower

- 27 = Power output stage
 for blower motor
 28 = Blower motor

Schematic circuit diagram of electronic climate control (continued)

A11

Circuit diagram
Ferrari Mondial



A12

Circuit diagram
Ferrari Mondial



6. Test equipment, tools, aids

Multimeter ETE 014.00
or e.g. Pontavi

0 684 101 400
Commercially available

Refrigerant spray

Commercially available

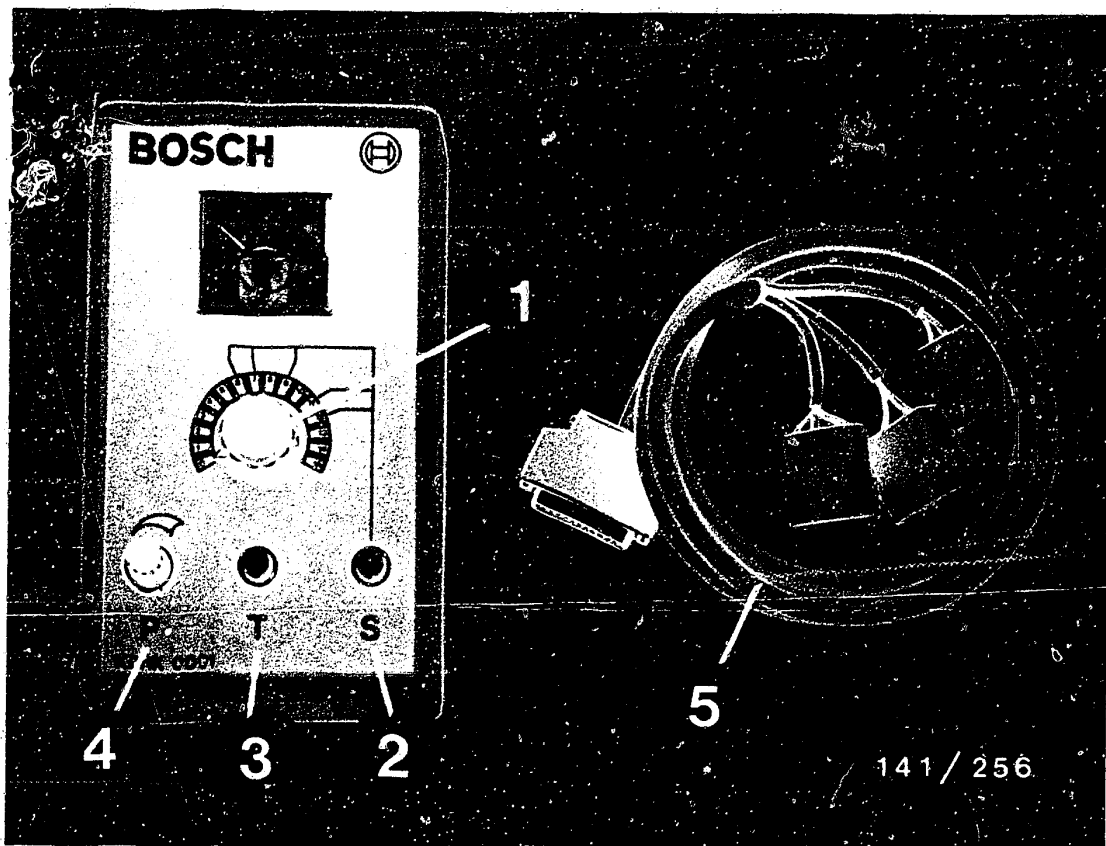
Air-conditioning
test adapter

KDHK 0001

Adapter lead

KDHK 0011





6.1 Heating and air-conditioning test adapter (KDHK 0001)

- 1 = Rotary switch (S1)
- 2 = Auxiliary switch (S)
- 3 = Push-button (T)
- 4 = Potentiometer (P)
- 5 = Adapter lead KDHK 0011

The heating and air-conditioning test adapter is used for checking the peripherals on heating control/air-conditioning systems. The electronic control units are not tested.

Construction

The test adapter is constructed so that, using the rotary switch (S1), the individual components as well as the electric leads are switched on and/or tested one after the other. Using the auxiliary switch (S), a certain component group can be checked for 2 different functions. Push-button (T) is used for the brief switching on of the compressor.

When testing the electronic climate control the potentiometer (P) has no function.

The adapter cable KDHK 0011 is used for testing the electronic climate control.



7. Installation position of components

ELECTRONIC CONTROL UNIT

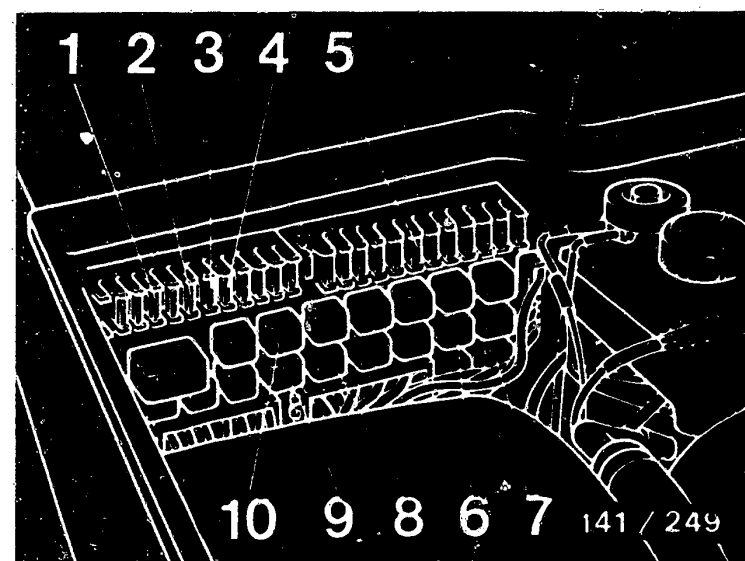
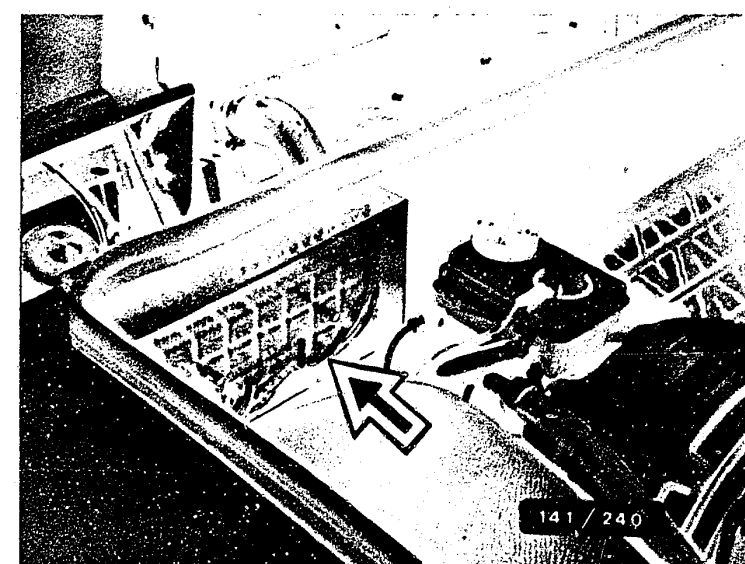
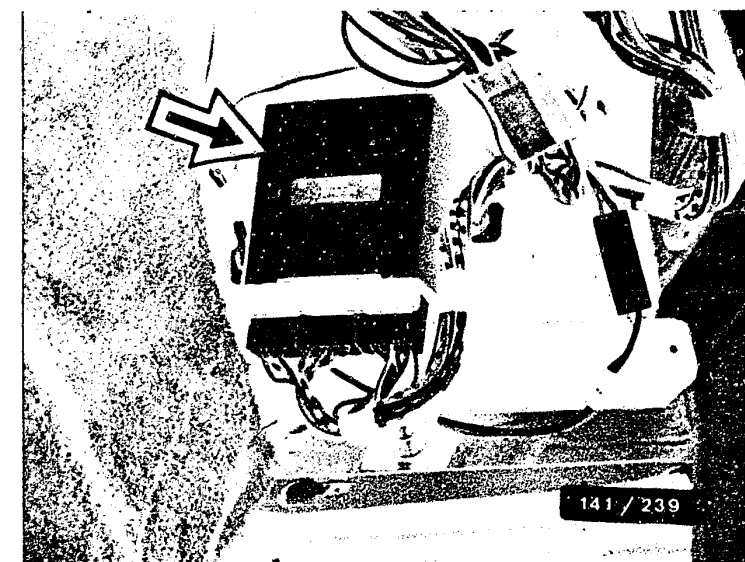
Installed underneath the passenger-side foot support (upper illustration, arrow). Accessible after the carpeting is unfastened (velcro-type fastener) and a sheet-metal screw (covered by carpet) on the center console side panelling is unscrewed.

CENTRAL ELECTRICS CONSOLE

To the left in direction of travel in front luggage space (middle illustration, arrow).

Overview of central electrics console (lower illustration)

- 1 = Rear-window heater fuse
- 2 = Condensor-fan fuse
- 3 = Fuse for left cooler fan
- 4 = Fuse for right cooler fan
- 5 = Air-conditioning system fuse
- 6 = A/C main relay
- 7 = Main relay terminal 15
- 8 = Relay for right cooler fan
- 9 = Relay for left cooler fan
- 10 = Relay for condensor fan



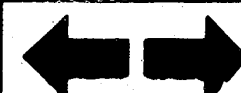
A16

Installation position of components
Ferrari Mondial



A17

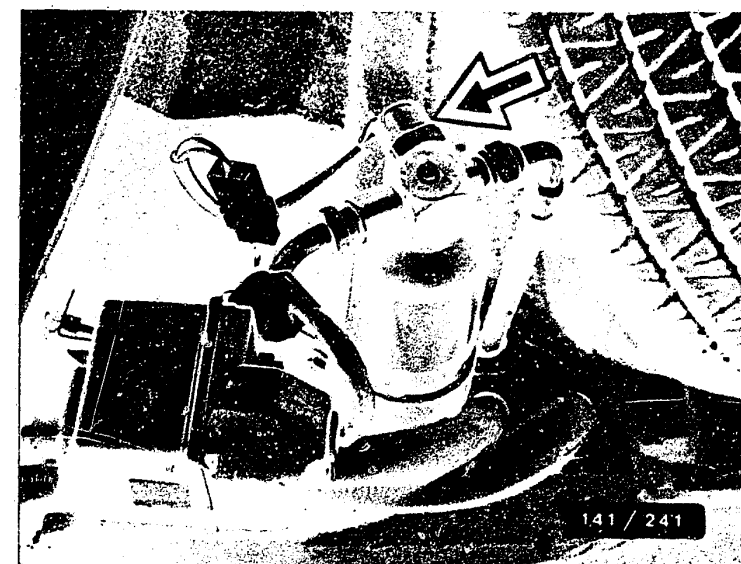
Installation position of components
Ferrari Mondial



Installation position of components (continued)

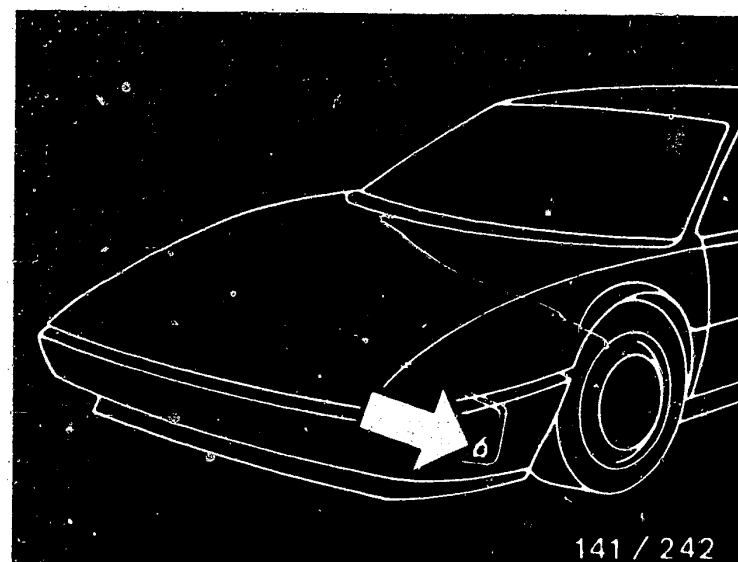
Dryer with high-/low-pressure switch (coolant circuit)

The dryer is installed in the front luggage space to the right of the blower box. The high-/low-pressure switch is installed on top of the dryer (upper illustration, arrow).

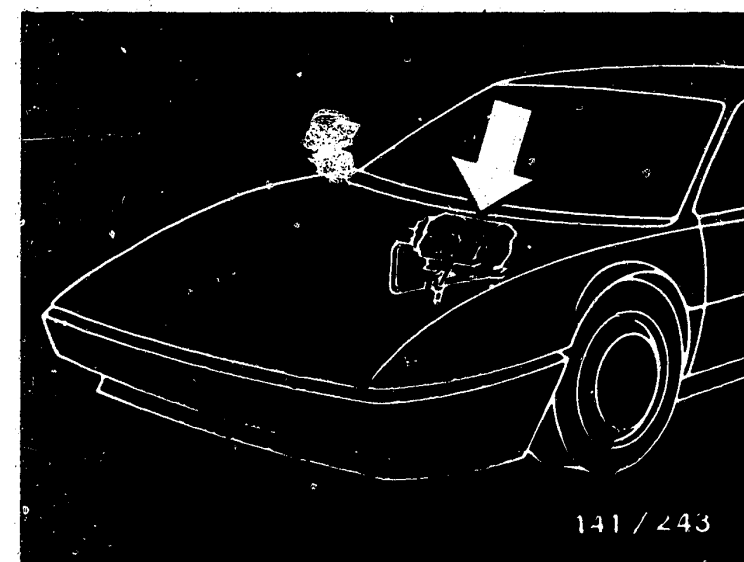


The condensor and condensor fan are located on the left in direction of travel in the wheel well.

THERMO-SWITCH FOR CONDENSOR FAN is clipped onto the coolant line shortly before the condensor (middle illustration, arrow).



POWER OUTPUT STAGE FOR BLOWER-SPEED CONTROL is installed in blower box in front luggage space (lower illustration, arrow).



A18

Installation position of components
Ferrari Mondial



A19

Installation position of components
Ferrari Mondial

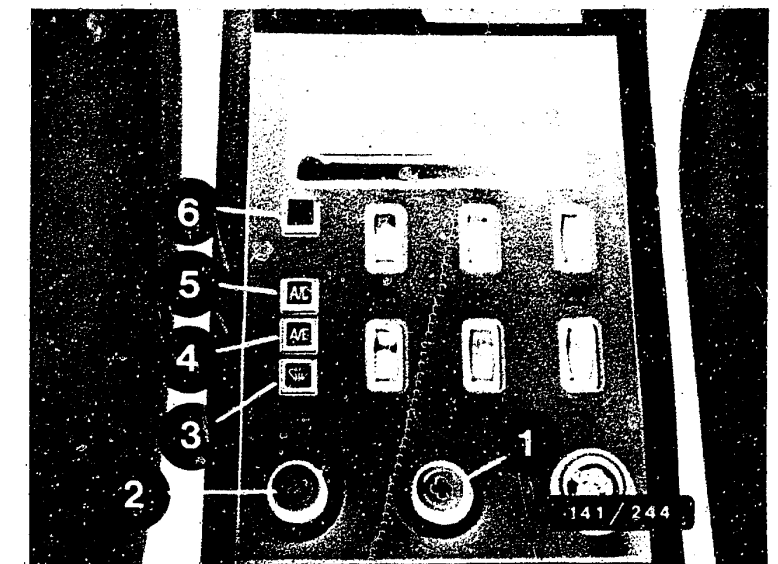


Installation position of components (continued)

Operating section for air conditioning:

Installed in center console (upper illustration).

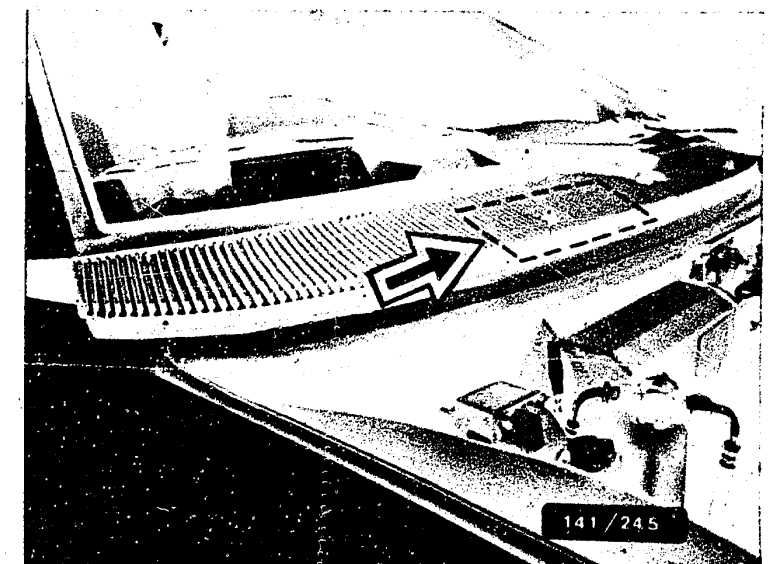
- 1 = Blower-speed selector
- 2 = Temperature selector
- 3 = DEF switch
- 4 = A/E switch
- 5 = A/C switch
- 6 = STOP switch



EVAPORATOR TEMPERATURE SENSOR AND OUTSIDE TEMPERATURE SENSOR

Installed on the right in front of windshield under a plastic grate in intake duct (middle illustration, arrow).

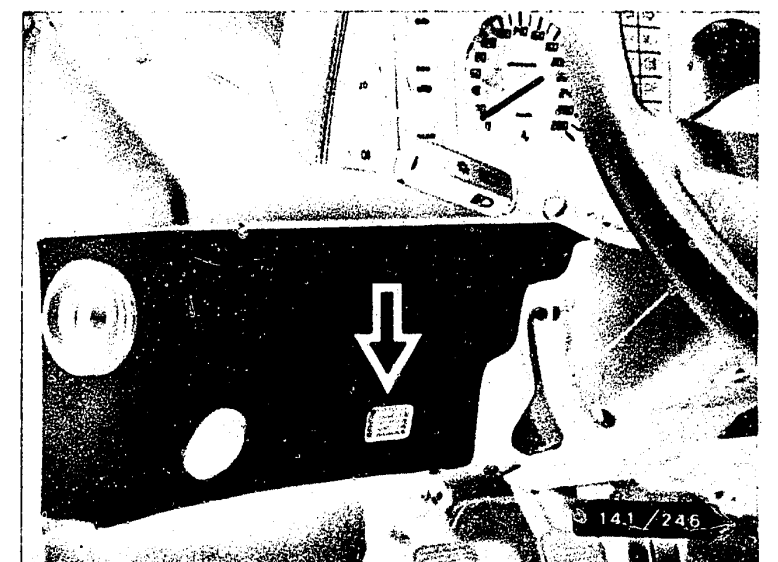
Directions for removal: Screen is often glued when windshield is glued in. If so pry out with knife under windshield frame. For removal and installation of the evaporator temperature sensor, the small covering on the heater box must also be removed.



INTERIOR TEMPERATURE SENSOR AND SUCTION BLOWER FOR INTERIOR TEMPERATURE SENSOR VENTILATION

The interior temperature sensor is located in the dashboard, driver's side (lower illustration, arrow).

The suction blower is installed next to the interior sensor behind the dashboard, connected with the sensor housing by a hose.



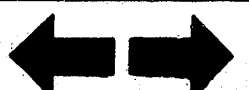
A20

Installation position of components
Ferrari Mondial



A21

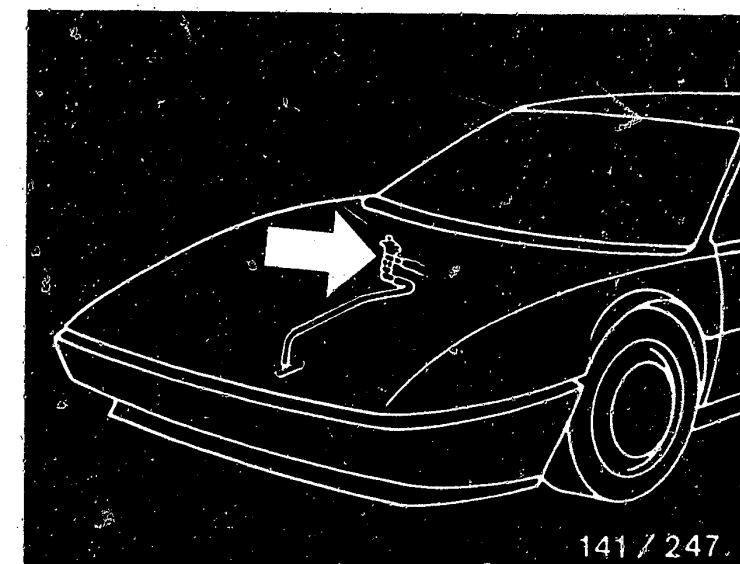
Installation position of components
Ferrari Mondial



Installation position of components (continued)

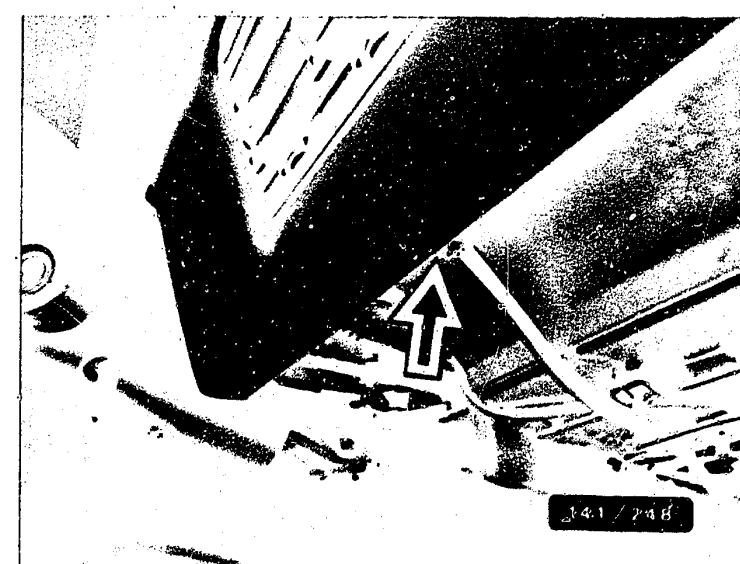
HOT-WATER VALVE

Installed in passenger-side footwell above wheel box, behind the dashboard panelling (upper illustration, arrow).



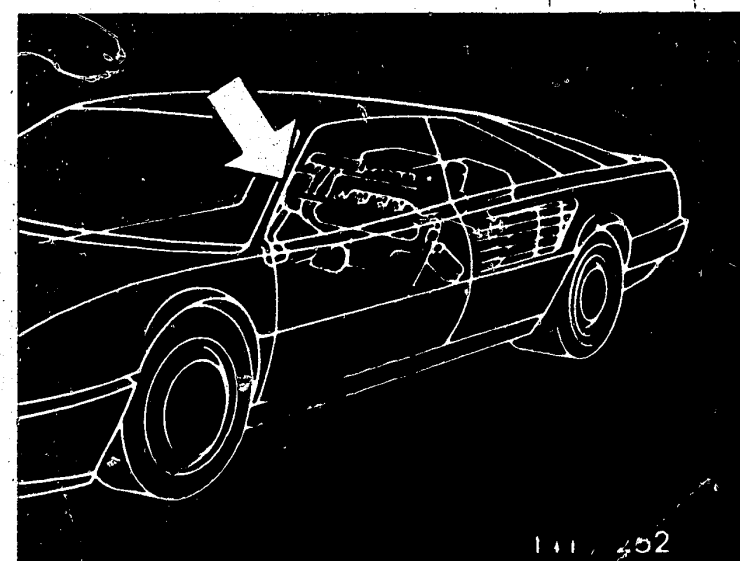
BLOW-IN TEMPERATURE SENSOR

Installed beneath the dashboard in middle of vehicle, above center console (middle illustration, arrow).



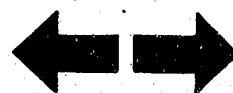
COOLANT COMPRESSOR WITH SOLENOID COUPLING

On engine to the right in direction of travel (lower illustration, arrow).



A22

Installation position of components
Ferrari Mondial



A23

Installation position of components
Ferrari Mondial



8. Trouble-shooting according to test steps

8.1 Test requirements

- Check the customer complaint
(Check operation of air-conditioner in accordance with vehicle owner manual).
- Electrical system (fuses, battery voltage) O.K.
- Refrigerant level O.K.
- Coolant level O.K.
- Engine running at operating temperature
- Blower-speed selector in middle position
- Temperature sensor approximately in middle position
(approx. +24°C)
- A/C switch disengaged
- Side and middle nozzles open

During detailed trouble-shooting starting from Coordinate B2, go through the test steps in ascending sequence. Branch off to the trouble-shooting column only when a malfunction is indicated.



8.2 Connection of adapter cable

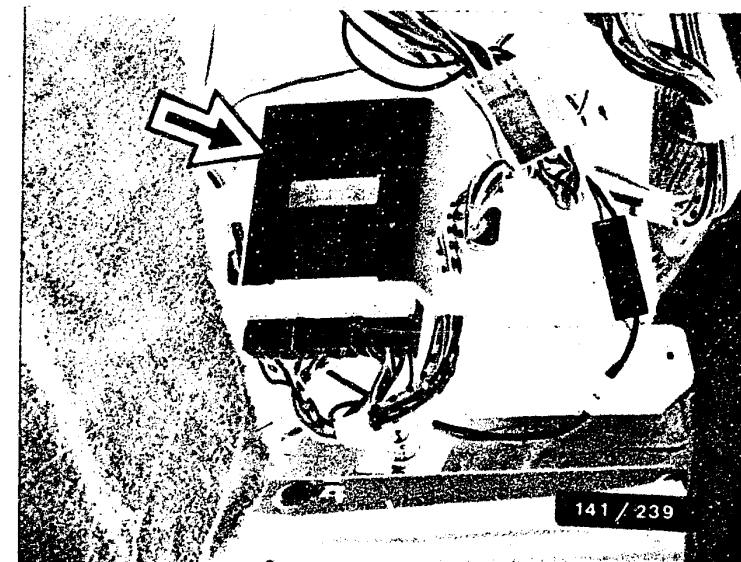
Clear the electronic control unit underneath the passenger's foot support (illustration, arrow).

Pull all 3 control-unit plugs from the electronic control unit and connect with the 3 couplings to the adapter cable KDHK 0011. Connect the other end of the adapter cable to the test adapter KDHK 0001. Start engine.

Note:

Carry out the trouble-shooting with the aid of the diagnosis chart.

If the connection between the control unit and the adapter lead or the adapter lead and the test adapter becomes separated, always first of all set the rotary switch on the test adapter to "0" and switch off the ignition.



TEST STEP 1:

Test of:

POWER SUPPLY, electronic control unit
plug B - control unit, term. 1 to term. 5
(upper illustration)

Measuring equipment:

Air-conditioning test adapter KDHK 0001

Measuring range

0 ... 15

Operation:

Rotary-switch position (S1): 1

Operation in vehicle:

Reading on test adapter:

10 ... 13

Is the test specification within the
tolerance?

no

Malfunction:

Reading < or > 15

Trouble-shooting:

1. Using voltmeter, test at control-
unit plug B jack 1 to jack 5.

Reading, desired: approx. U_B

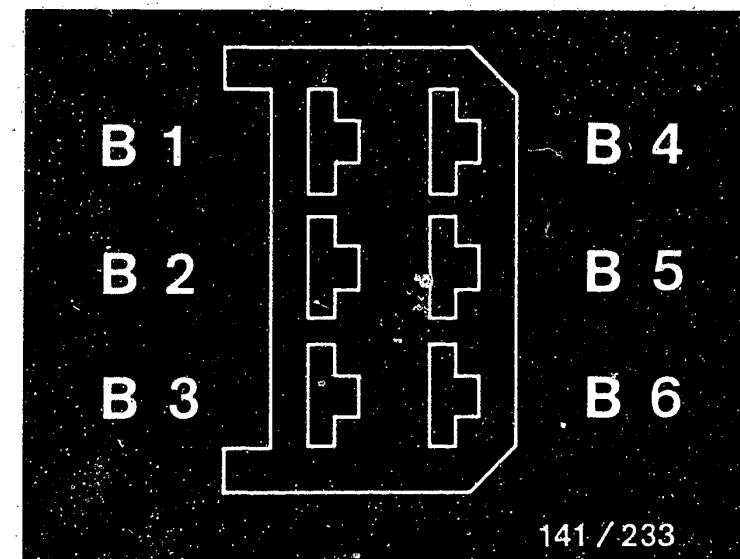
2. Check fuses

3. Switch off ignition. Using
ohmmeter, check lead of relay for
term. 15 to control-unit plug B,
term. 1, including leads from
control-unit plug B, term. 5 to
vehicle ground.

Reading, desired: approx. 0Ω

Eliminate open circuits/contact
resistances at leads.

If reading > 15, the generator
regulator is defective.



yes

Continued on next micropicture

B4

Trouble-shooting
Ferrari Mondial



B5

Trouble-shooting
Ferrari Mondial



TEST STEP 2:

Test of:
TEMPERATURE SELECTOR
(Upper illustration)

Measuring equipment:
Air-conditioning test adapter KDHK 0001

Measuring range:
0 ... 15

Operation:
Rotary-switch position (S1): 3

Operation in vehicle:
Turn temperature selector all the way from cold to warm.

Reading at test adapter:
0 ... 13

Reading must change evenly.

Is test reading within tolerance?
Does reading change evenly?

no

Malfunction:

No reading or jumpy reading.

Trouble-shooting:

Using voltmeter, test on pulled temperature-selector plug between terms. 1 (+) and 2 (-).

Nominal reading: approx. U_B

(Test adapter connected and rotary switch in position 3)

Using ohmmeter, test leads from temperature-selector plug term. 3 and term. 2 to control-unit plug C term. 6 (lower illustration) and term. 2.

Nominal reading: approx. $0\ \Omega$

Measure resistance directly between terms. 1 and 2 on temperature-selector plug.

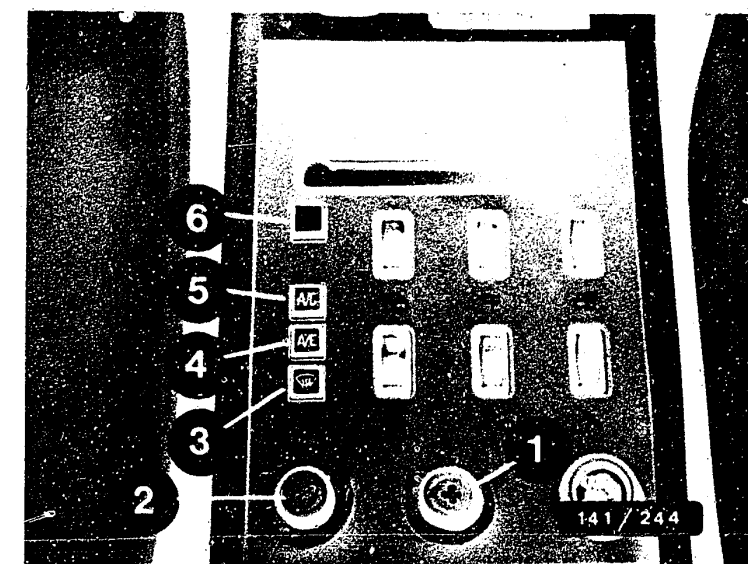
Nominal reading: approx. $10\ k\Omega$

Eliminate open circuits/contact resistances in leads.

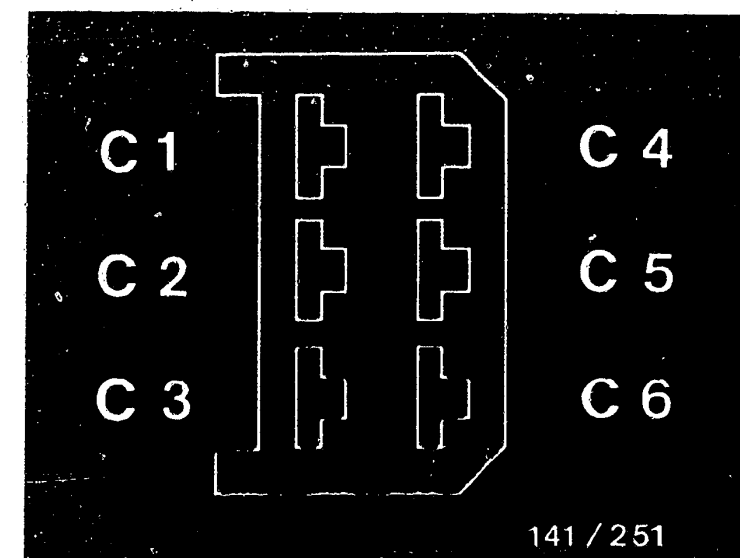
Replace defective temperature selector.

yes

Continued on next micropicture



- 1 = Blower-speed selector
- 2 = Temperature selector
- 3 = DEF switch
- 4 = A/ECO switch
- 5 = A/C switch
- 6 = STOP switch



B6

Trouble-shooting
Ferrari Mondial



B7

Trouble-shooting
Ferrari Mondial



TEST STEP 3:

Subject of testing:

SOLENOID COUPLING, refrigeration compressor
(upper illustration)

Measuring equipment:

A/C test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 3

Operation in vehicle:

Switch off engine

Additional operation:

Press button T on test adapter, coupling
should click audibly.

Reading on test adapter:

0 ... 3

Engine running in idle.

Keep button T on test adapter depressed.

Air stream should cool down significantly.

Does solenoid coupling click, does air stream
cool down?

no

Malfunction:

Solenoid coupling does not click,
air stream does not cool down.

Trouble-shooting:

Switch off engine.

Test high-/low-pressure switch for
compressor for continuity (in front
luggage space on dryer).

Using ohmmeter, test lead from
pulled control-unit plug

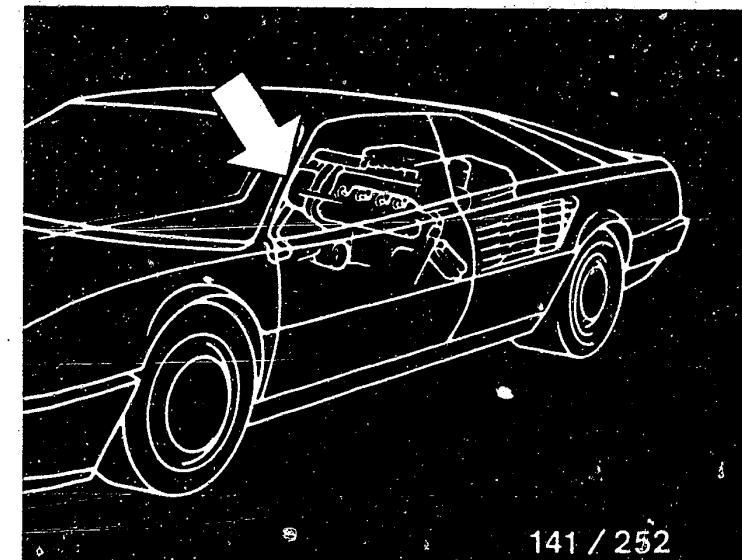
A term. 1 (lower illustration)
through high-/low-pressure switch to
solenoid coupling and on to ground.

Nominal reading: approx. 0 Ω

Eliminate open circuits/contact
resistances in leads.

Replace defective solenoid coupling.

Test compressor for mechanical
defects per manufacturer's
information.

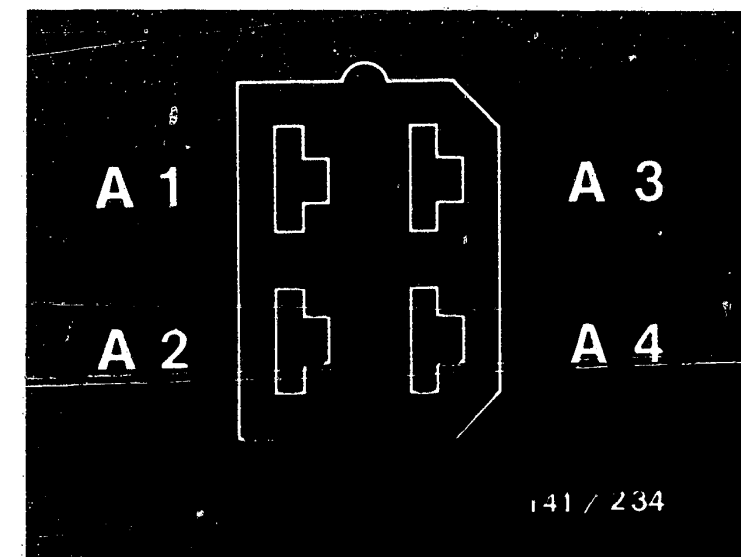


Arrow = Refrigeration compressor with
solenoid coupling

141 / 252

yes

Continued on next page



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B8

Trouble-shooting
Ferrari Mondial



B9

Trouble-shooting
Ferrari Mondial



TEST STEP 4:

Test of:

EVAPORATOR TEMPERATURE SENSOR (beneath plastic cover, illustration, arrow).

Measuring equipment:

Air-conditioning test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 5

Additional operation:

Release push-button (T) on test adapter.

Reading on test adapter:

9 ... 11

Is the test specification within the tolerance?

no

Malfunction:

Reading < 9

Trouble-shooting:

Pull control-unit plugs A and B from adapter cable. Using ohmmeter, test between plug A term. 3 and plug C term. 4.

Nominal reading: approx. 9 k Ω at approx. 25°C

If there is no reading, remove plastic screen below windshield (illustration, arrow).

Note: Grate is often glued when windshield is glued in - if so, use knife to loosen grate under windshield frame. Remove small covering on heating box. Pull plug on evaporator temperature sensor. Using ohmmeter, test lead from plug A term. 3 and plug C term. 4 at control unit to plug on evaporator temperature sensor.

Nominal reading: approx. 0 Ω

Eliminate open circuit/contact resistances in leads.

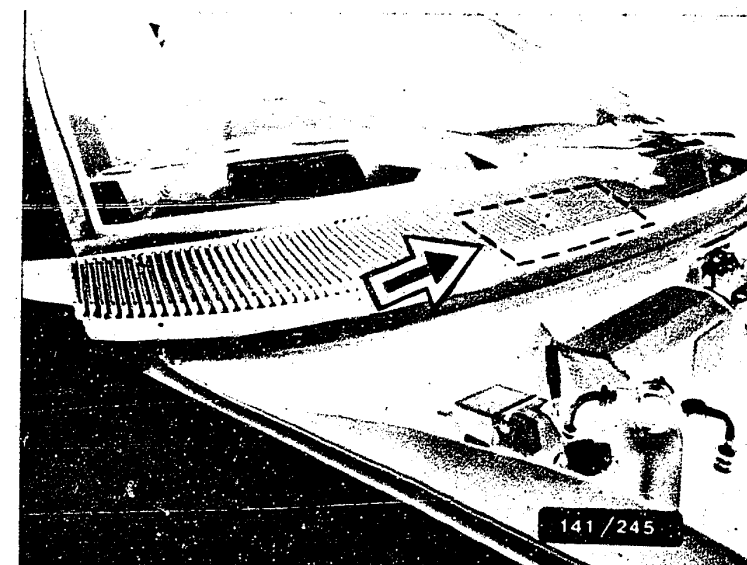
Connect ohmmeter directly to contacts of evaporator temperature sensor.

Nominal reading: approx. 9 k Ω at approx. 25°C

Replace defective sensor.

yes

Continued on next micropicture



Arrow: Evaporator temperature sensor and outside temperature sensor located beneath plastic grate in fresh-air intake duct.

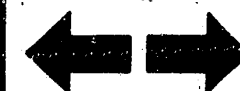
B 10

Trouble-shooting
Ferrari Mondial



B 11

Trouble-shooting
Ferrari Mondial



TEST STEP 4.1:

Subject of testing:
EVAPORATOR TEMPERATURE SENSOR
(illustration, arrow)

Measuring equipment:
Air-conditioning test adapter KDHK 0001

Measuring range:
0 ... 15

Operation:
Rotary-switch position (S1): 5

Additional operation:
Release push-button (T) on test adapter.

Reading on test adapter:
Value falls

Is the test specification within the tolerance?

no

Malfunction:

Reading < 9

Trouble-shooting:

Pull control-unit plugs A and B from adapter cable. Using ohmmeter, test between plug A term. 3 and plug C term. 4.

Nominal reading: approx. 9 k Ω
at approx. 25°C

If there is no reading, remove plastic screen below windshield (illustration, arrow).

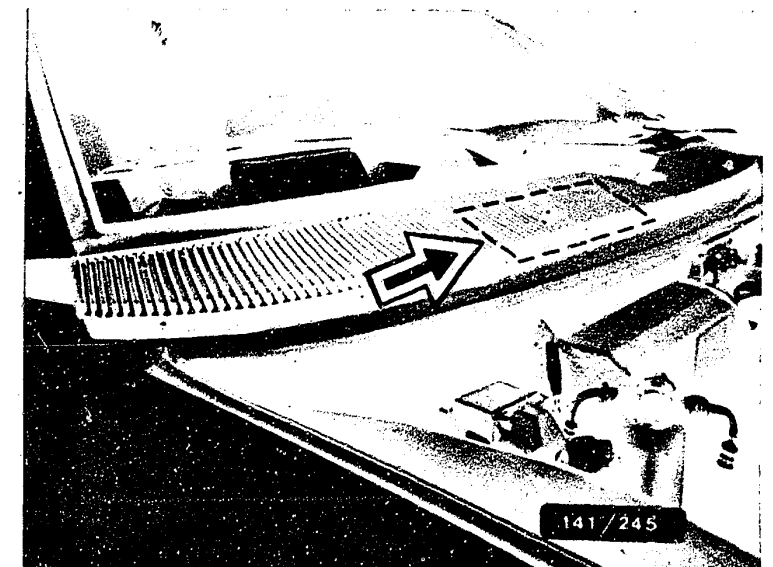
Note: Grate is often glued when windshield is glued in - if so, use knife to loosen grate under windshield frame. Remove small covering on heating box. Pull plug on evaporator temperature sensor. Using ohmmeter, test lead from plug A term. 3 and plug C term. 4 at control unit to plug on evaporator temperature sensor.

Nominal reading: approx. 0 Ω
Eliminate open circuits/contact resistances.

Connect ohmmeter directly to contacts of evaporator temperature sensor.

Nominal reading: approx. 9 k Ω at approx. 25°C

Replace defective sensor.



Arrow: Evaporator temperature sensor and outside temperature sensor located beneath plastic grate in fresh-air intake duct.

yes

Continued on next micropicture

B12

Trouble-shooting
Ferrari Mondial



B13

Trouble-shooting
Ferrari Mondial



TEST STEP 5:

Test of:
HEATING-WATER VALVE
(illustration, arrow)

Measuring equipment:
Air-conditioning test adapter KDHK 0001

Measuring range:
0 ... 15

Operation:
Rotary-switch position (S1): 7

Operation in vehicle:
Engine running, slide blower-speed selector to highest speed.

Additional operation:
Press auxiliary switch "S" on test adapter.

Reading on test adapter:
0 ... 3

Check by feeling that there is no heating effect.

Is the test specification within the tolerance?

Is there no heating effect?

yes

Continued on next micropicture

no

Malfunction:

Heating despite auxiliary switch "S" being depressed.

Trouble-shooting:

Using voltmeter, test at plug for heating-water valve (ignition switched on)

Nominal reading: approx. 0g

Switch off ignition. Using ohmmeter, test leads from control-unit plug B (lower illustration) term. 3 to plug for heating-water valve and from relay for term. 15 to plug for heating-wire valve.

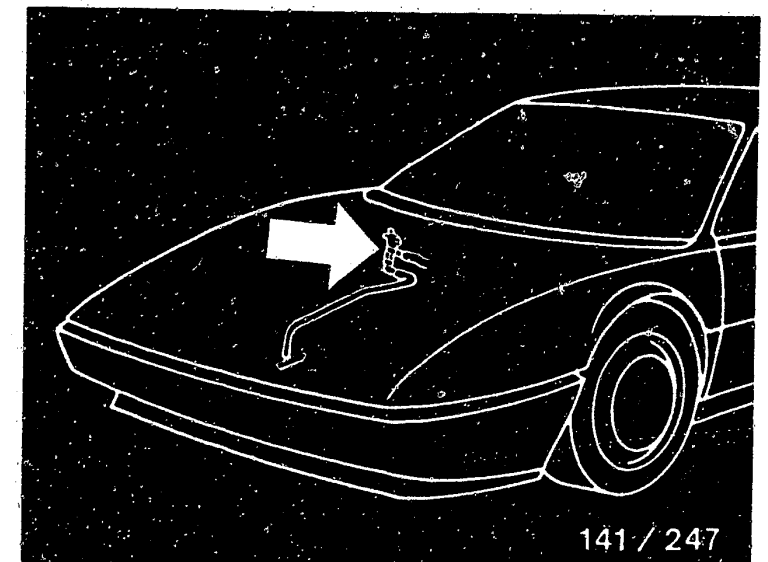
Nominal reading: approx. 0 Ω each

Check fuse for relay for term. 15. Using ohmmeter, test at control-unit plug B term. 3 to term. 5.

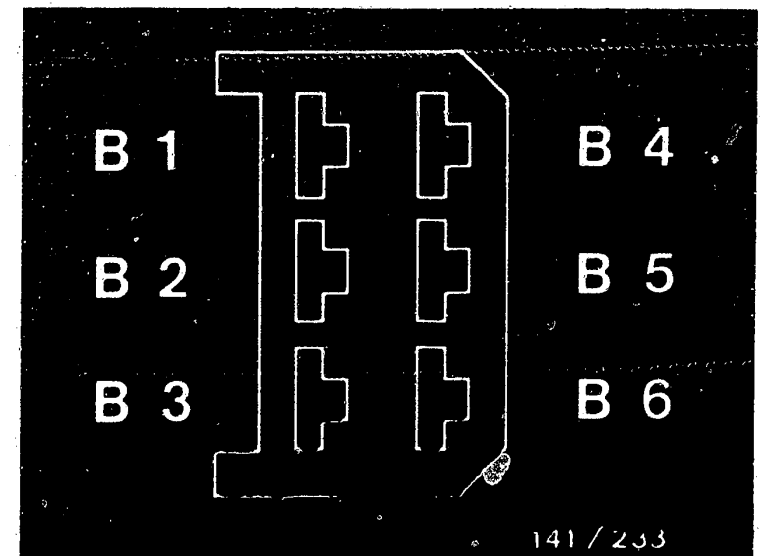
Nominal reading: $\infty\Omega$
(Plug disconnected from heating-water valve)

Eliminate short circuits, contact resistances, and open circuits in leads.

If leads are in good condition and battery voltage present, but there is still heating, the heating-water valve is mechanically defective and must be replaced.



Arrow: Installation position of heating water valve in passenger-side footwell underneath dashboard



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Trouble-shooting
Ferrari Mondial



B15

Trouble-shooting
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TEST STEP 5.1:

Test of:

HEATING-WATER VALVE (open when deenergized)

Measuring equipment:

Air-conditioning test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 7

Operation in vehicle:

Engine running, blower-speed selector at highest speed.

Additional operation:

Press auxiliary switch "S" on test adapter once more (unlatch).

Reading on test adapter:

9 ... 14

Check by feeling that there is a heating effect.

Is the test specification within the tolerance?

Is there a heating effect?

yes

Continued on next micropicture

no

Malfunction:

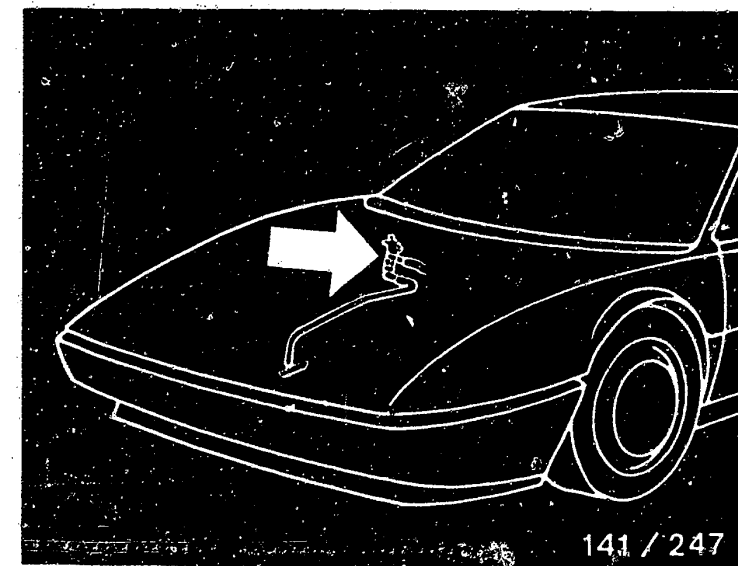
Despite reading approx. 9 ... 14, heating effect

Trouble-shooting:

Heating-water valve electrically O.K., but mechanically defective - replace.

Note:

If system only heats at low engine speed, then replace heating-water valve.



Arrow: Installation position of heating water valve in passenger-side footwell underneath dashboard

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Trouble-shooting
Ferrari Mondial



TEST STEP 6:

Carry out immediately after test step 5.1 (water in heat exchanger must be hot at beginning of test).

Subject of testing:

BLOW-IN TEMPERATURE SENSOR
(brown housing, upper illustration, arrow)

Measuring equipment:

A/C test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position
(S1): 13

Operation in vehicle:

Engine running
Turn blower-speed selector
to highest level.

Reading on test adapter:

7 ... 12
slowly falling.

Is test reading within tolerance?
Is reading slowly falling?

yes

Continued on next page

Malfunction:

Reading approx. 0 or approx. 15, not slowly retreating.

Trouble-shooting:

Switch off ignition.

Using ohmmeter, test following leads:

From control-unit plug C (lower illustration),
term. 1 to plug for temperature sensor and

from control-unit plug C term. 4 to plug for
temperature sensor

Nominal reading: approx. 0 Ω

Test control-unit plug C term. 1 to term. 4 (pull
plug from temperature sensor)

Nominal reading: approx. $\infty \Omega$

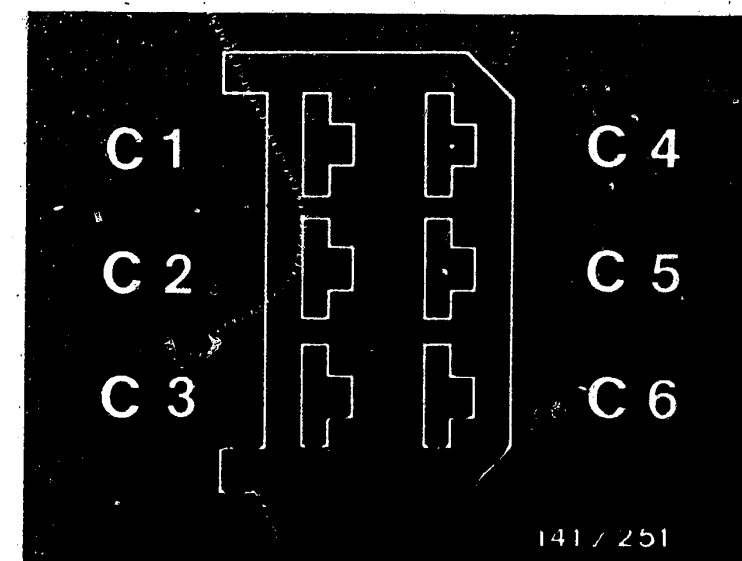
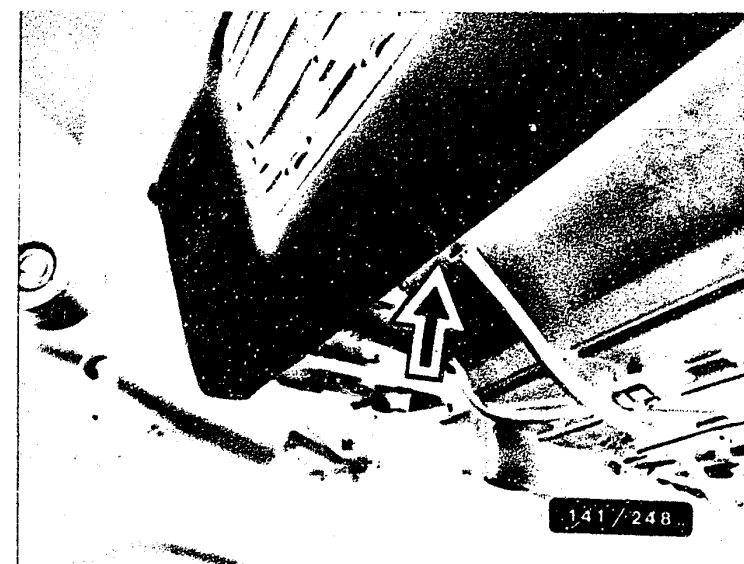
Test resistance directly at plug pins of blow-in
temperature sensor.

Nominal reading: approx. 12.5 k Ω
at approx. 20°C

Spray blow-in temperature sensor with refrigerant
spray. Resistance must rise.

Note:

If "slowly falling" reading not obtained, it may
be that the hot water in the heat exchanger has
already cooled off too much. If so, turn rotary
switch (S1) on test adapter to position 12 for at
least 15 seconds again. (Auxiliary switch (S)
disengaged). Then proceed with test step 6.



TEST STEP 7:

Test of:

PASSENGER-COMPARTMENT TEMPERATURE SENSOR
(illustration, arrow)

Measuring equipment:

Air-conditioning test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 10

Operation in vehicle:

Reading on test adapter:

7 ... 11

Is the test specification within the
tolerance?

no

Malfunction:

Reading < 7

Trouble-shooting:

Disconnect control-unit plug C from
adapter lead. Using ohmmeter, check
at plug C between term. 3 and term.
4.

Reading, desired: approx. 12.5 k Ω
at approx. 20°C

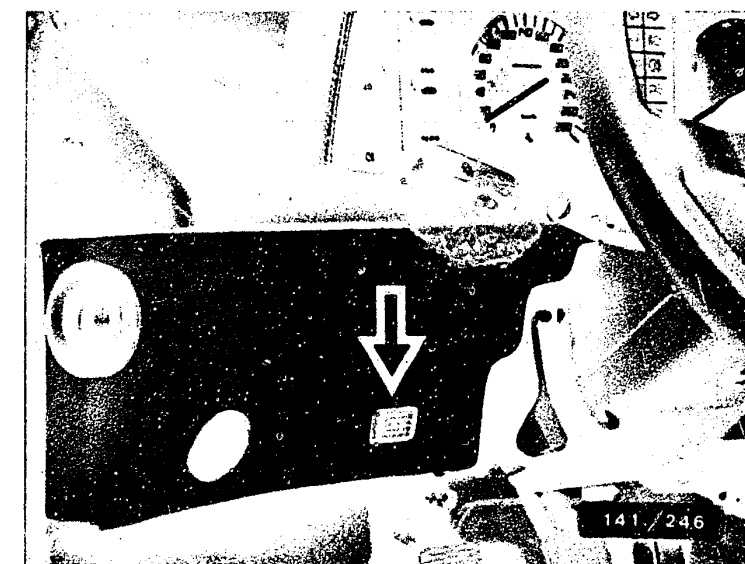
If no reading, disconnect plug at
passenger-compartment temperature
sensor. Using ohmmeter, check leads
of control-unit plug C, term. 3 and
term. 4 to plug, passenger-
compartment temperature sensor.

Reading, desired: approx. 0 Ω

Eliminate short circuit/contact
resistance at leads.
Connect ohmmeter directly to the
contacts of the passenger-
compartment temperature sensor.

Reading, desired: approx.
12.5 k Ω at approx. 20°C.

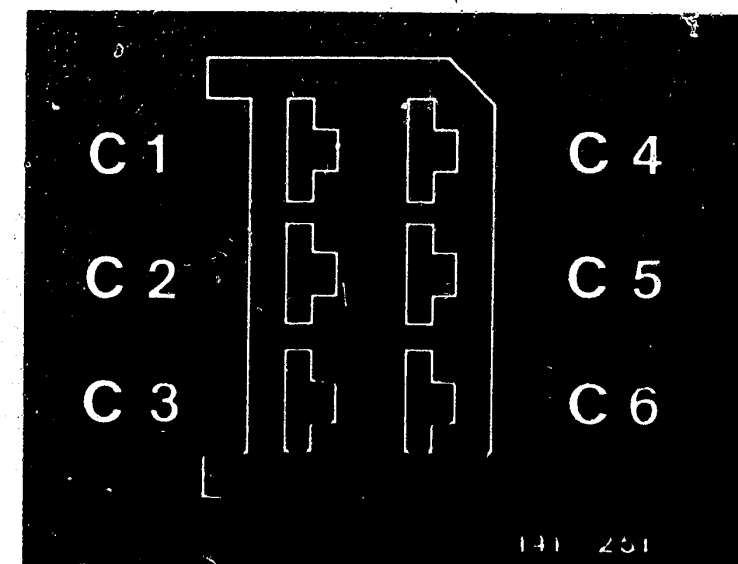
Replace defective sensor.



Arrow = Interior temperature
sensor, connected by hose to
suction blower (behind).

yes

Continued on next micropicture



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Trouble-shooting
Ferrari Mondial



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Trouble-shooting
Ferrari Mondial



TEST STEP 7.1:

Test of:
PASSENGER-COMPARTMENT TEMPERATURE SENSOR
(illustration, arrow)

Measuring equipment:
Air-conditioning test adapter KDHK 0001

Measuring range:
0 ... 15

Operation:
Rotary-switch position (SI) · 10

Additional operation:
Spray refrigerant spray through intake
opening on sensor.

Reading on test adapter:
Reading falling during cooling down.

Does reading fall during cooling down?

no

Malfunction:

Reading not falling during cooling
down.

Trouble-shooting:

Disconnect control-unit plug C from
adapter lead. Using ohmmeter, check
at plug C between term. 3 and term.
4.

Reading, desired: approx. 12.5 k Ω
at approx. 20°C

If no reading, disconnect plug at
passenger-compartment temperature
sensor. Using ohmmeter, check leads
of control-unit plug C, term. 3 and
term. 4 to plug, passenger-
compartment temperature sensor.

Reading, desired: approx. 0 Ω .

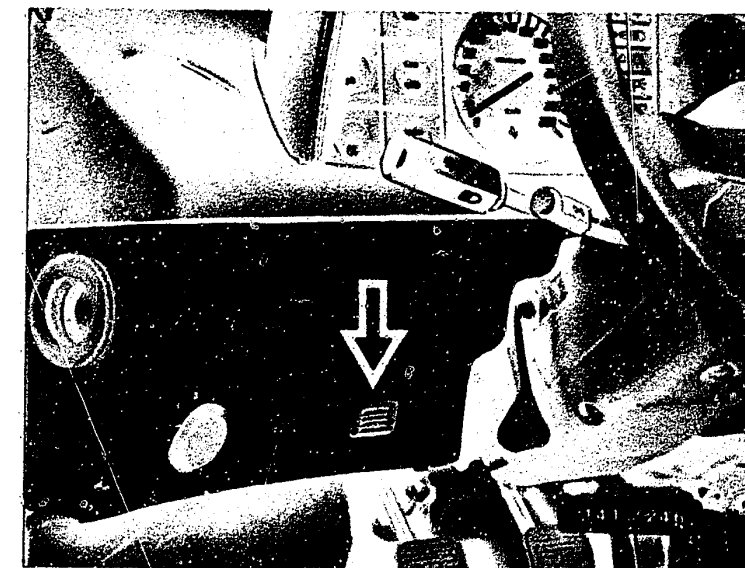
Eliminate short circuit/contact
resistance at leads.
Connect ohmmeter directly to the
contacts of the passenger-
compartment temperature sensor.

Reading, desired: approx.
12.5 k Ω at approx. 20°C.

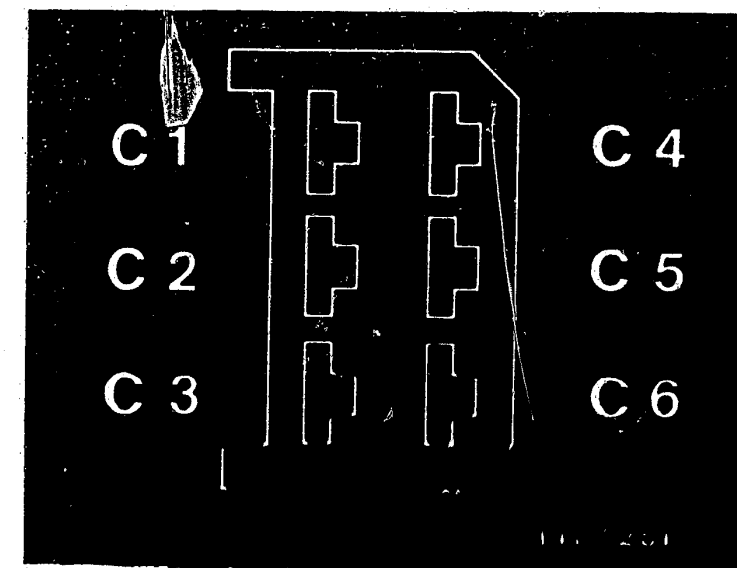
Replace defective sensor.

yes

Continued on next micropicture



Arrow = Interior temperature sensor,
connected by hose to suction blower
(behind).



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Trouble-shooting
Ferrari Mondial



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Trouble-shooting
Ferrari Mondial



TEST STEP 7.2

Subject of testing:
INTERIOR TEMPERATURE SENSOR
(Illustration, arrow)

Measuring equipment:
Paper strip or similar

Operation in vehicle:
Engine running, turn blower-speed selector
(lower illustration, 1) to highest level.

Additional operation:
Hold paper strip in front of ventilation
opening (upper illustration, arrow).

Reading:
Paper strip is pulled towards opening.

Is paper strip pulled towards opening?

no

Malfunction:

No air suction can be determined.

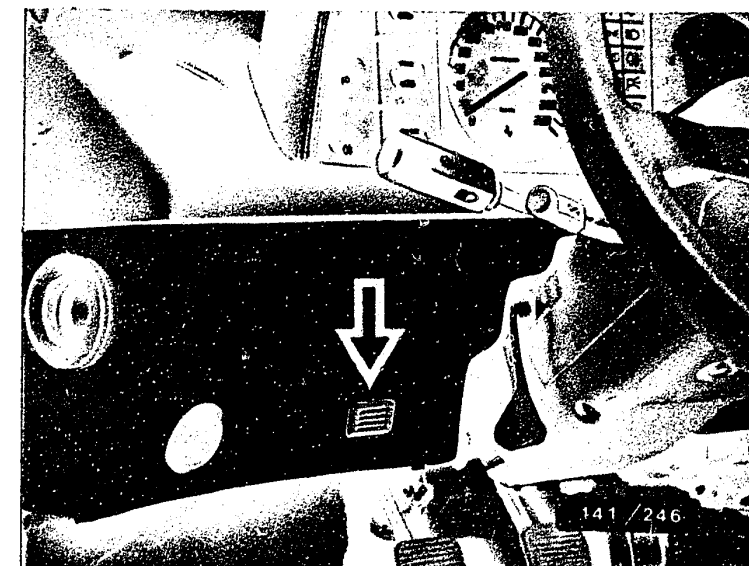
Trouble-shooting!

Check hose between housing for
interior temperature sensor and
suction blower for sealing and good
seating.

Using voltmeter, test at plug for
suction blower (ignition on):

Nominal reading: approx. U_g

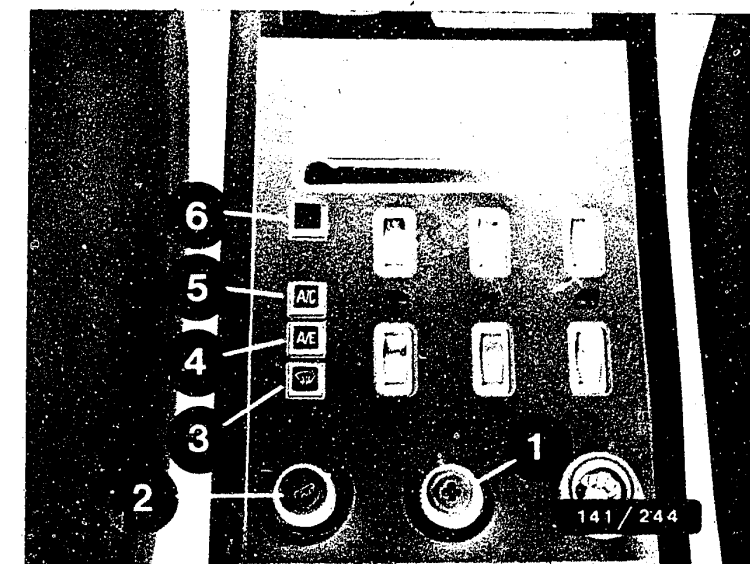
Eliminate open circuit/contact
resistances in leads.
If reading U_g present but suction
blower does not run, replace suction
blower.



Arrow = Interior temperature sensor,
connected by hose to suction
blower (behind).

yes

Continued on next page



C1

Trouble-shooting
Ferrari Mondial



C2

Trouble-shooting
Ferrari Mondial



TEST STEP 8:

Subject of testing:

HOT-WATER PUMP (upper illustration, arrow)

Measuring equipment:

A/C test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 11

Operation in vehicle:

Switch off engine, ignition on, turn blower-speed selector to lowest level.

Additional operation:

Press auxiliary switch (S) on test adapter.

Reading on test adapter:

0 ... 3

Determine that hot-water pump is running by feel or hearing.

Is test reading within tolerance?

Is hot-water pump running?

yes

Continued on next page

no

Malfunction:

Hot-water pump not running.

Trouble-shooting:

Using voltmeter, test at plug for hot-water pump (ignition switched on)

Nominal reading: approx. U_B

Switch off ignition. Using ohmmeter, test leads from control-unit plug B (lower illustration) term. 2 to plug for hot-water pump and from relay for term. 15 to plug for hot-water pump.

Nominal reading: approx. 0Ω each

Inspect fuse for relay term. 15.

Using ohmmeter, test at control-unit plug B, term. 2 to term. 5.

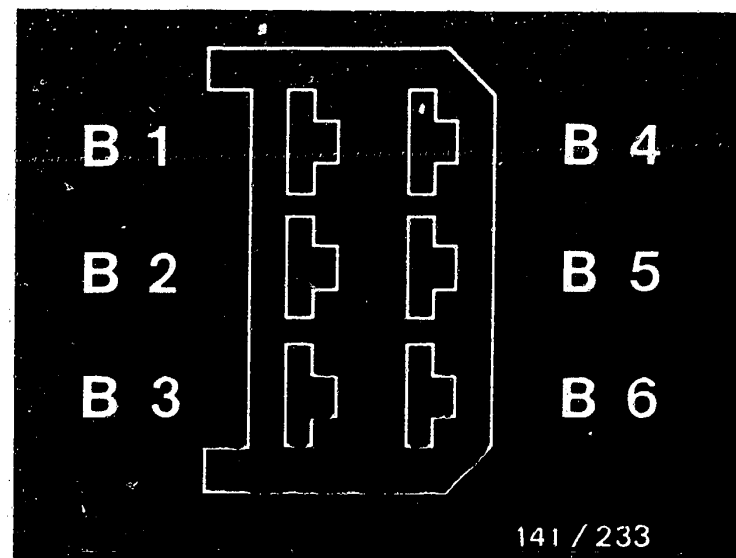
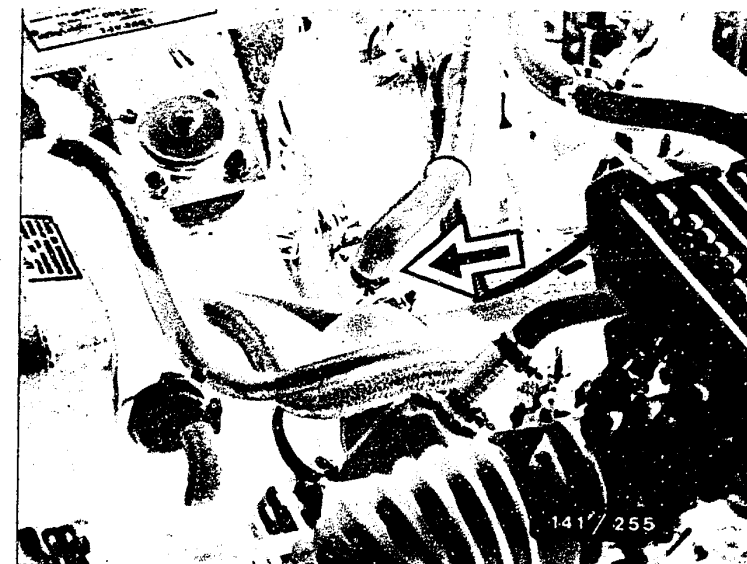
Nominal reading: $\infty \Omega$

(Plug pulled from hot-wire pump).

Short circuits

Eliminate contact resistances/open circuits in leads.

Replace hot-water pump.



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C3

Trouble-shooting

Ferrari Mondial



C4

Trouble-shooting

Ferrari Mondial



TEST STEP 8.1

Subject of testing:

HOT-WATER PUMP (upper illustration, arrow)

Measuring equipment:

A/C test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 11

Operation in vehicle:

Switch off engine, ignition on, turn blower-speed selector to lowest level.

Additional operation:

Again press auxiliary switch (S) on test adapter (disengage)

Reading on test adapter:

9 ... 14

Determine that hot-water pump is not running by feel or hearing.

Is test reading within tolerance?
Is hot-water pump off?

yes

Continued on next page

no

Malfunction:

Hot-water pump running.

Trouble-shooting:

Using voltmeter, test at plug for hot-water pump (ignition switched on).

Nominal reading: approx. U_B

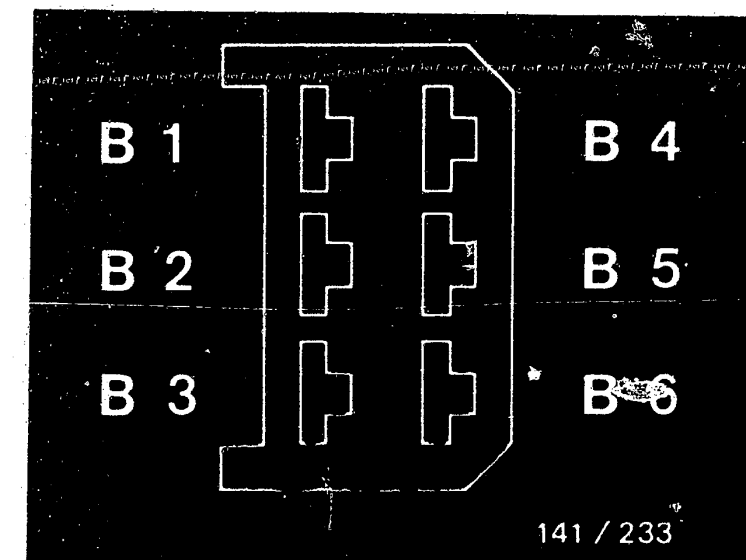
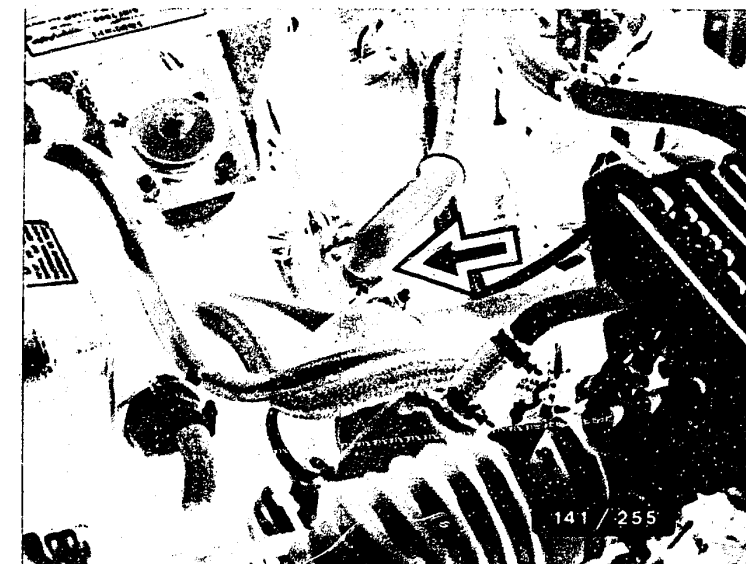
Switch off ignition. Using ohmmeter, test lead from control-unit plug (lower illustration) B term. 2 to plug for hot-water pump.

Nominal reading: approx. 0Ω

Using ohmmeter, test at control-unit plug B term. 2 to term. 5.

Nominal reading: $\infty \Omega$
(Plug pulled from hot-water pump)

Eliminate short circuits, contact resistances, and open circuits in leads.



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Trouble-shooting

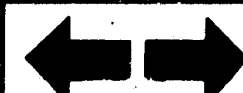
Ferrari Mondial



C6

Trouble-shooting

Ferrari Mondial



TEST STEP 9:

Subject of testing:

OUTSIDE TEMPERATURE SENSOR

(under plastic grate in fresh-air intake duct, upper illustration, arrow).

Measuring equipment:

A/C test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 8

Operation in vehicle:

--

Reading on test adapter:

9 ... 11

Is test reading within tolerance?

no

Malfunction:

Reading < 9

Trouble-shooting:

Pull control-unit plugs B and C from adapter cable.

Using ohmmeter, test between control-unit plug C term. 5 and control-unit plug C term. 4.

Nominal reading: approx. 950 Ω at approx. 20°C

If there is no reading, remove plastic grate beneath windshield (illustration, arrow).

Note: Grate is often glued along with windshield when the windshield is glued - if so, use a knife to loosen the grate under the windshield frame.

Pull plug on outside temperature sensor. Using ohmmeter, test leads from control-unit plug C term. 4 and term. 5 to plug on outside temperature sensor.

Nominal reading: approx. 0 Ω

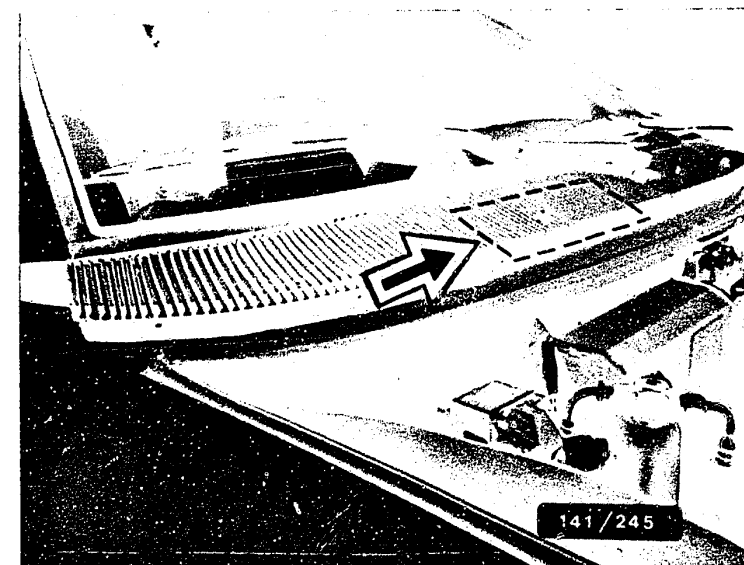
Eliminate open circuits/contact resistances. Connect ohmmeter directly to contacts of outside temperature sensor.

Nominal reading: approx. 950 Ω at approx. 20°C

Replace defective sensor.

yes

Continued on next page



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Trouble-shooting
Ferrari Mondial



C8

Trouble-shooting
Ferrari Mondial



TEST STEP 10:

Subject of testing:
DEF SWITCH
(upper illustration, 3)

Measuring equipment:

A/C test adapter KDHK 0001

Measuring range:

0 ... 15

Operation:

Rotary-switch position (S1): 14

Operation in vehicle:

Operate DEF switch

Reading on test adapter:

11 ... 13

Is test reading within tolerance?

no

Malfunction:

Reading < 11

Trouble-shooting:

Pull control-unit plugs A and B from adapter cable. Using ohmmeter, test between plug A term. 2 and plug B term. 5.

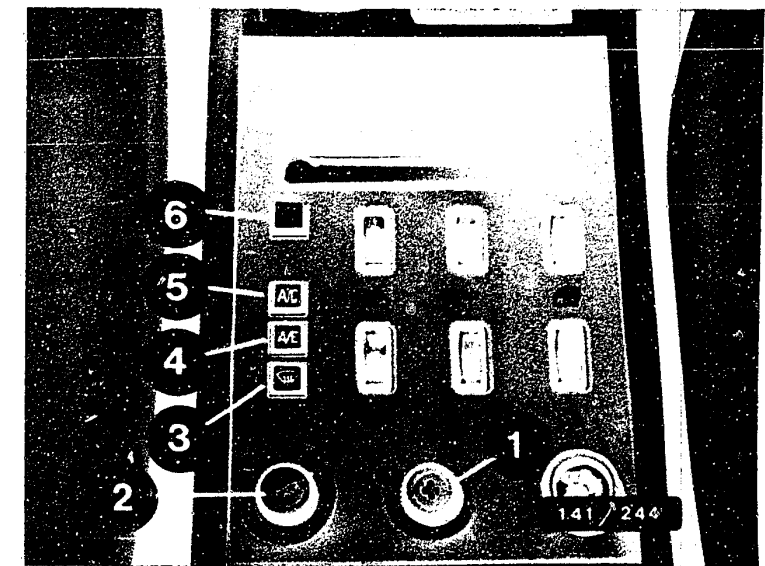
Nominal reading approx. U_g

Using ohmmeter, test lead from control-unit plug A term. 2 to connection for DEF switch.

Nominal reading: approx. 0Ω

Eliminate open circuits/contact resistances in leads.

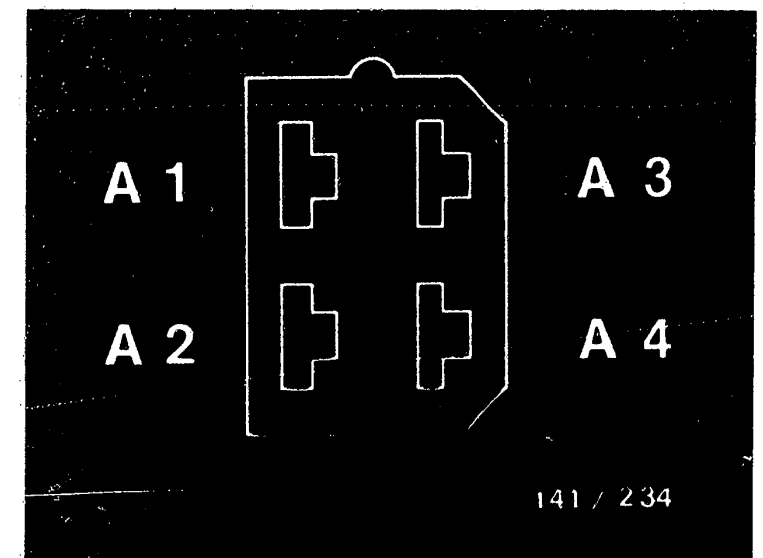
Replace defective DEF switch.



- 1 = Blower-speed selector
- 2 = Temperature selector
- 3 = DEF switch
- 4 = A/E switch
- 5 = A/C switch
- 6 = STOP switch

yes

Continued on next page



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Trouble-shooting
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C10

Trouble-shooting
Ferrari Mondial



End of trouble-shooting

If no fault was found when testing the system, try exchanging the electronic control unit.

Test the air-conditioning control once again in accordance with the vehicle owner manual.

If the fault is still present in the system, a mechanical fault in the refrigerator circuit and heating circuit cannot be ruled out.



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